4.5 TERRESTRIAL VEGETATION

4.5.1 Introduction

This section describes potential impacts to terrestrial vegetation resources associated with the construction and operation of the proposed Project and connected actions and discusses potential mitigation measures that would avoid or minimize the potential impacts. The information, data, methods, and/or analyses used in this discussion are based on information provided in the 2011 Final Environmental Impact Statement (Final EIS) as well as new circumstances or information relevant to environmental concerns that have become available since the publication of the Final EIS, including the proposed reroute in Nebraska. The information that is provided here builds on the information provided in the Final EIS, and in many instances, replicates that information with relatively minor changes and updates. Other information is entirely new or substantially altered from that presented in the Final EIS. Specifically, the following items have been substantially updated from the 2011 document related to impacts to terrestrial vegetation resources:

- A new section, Section 4.5.2, Impact Assessment Methodology, was added to explain the assessment methodology used to evaluate potential terrestrial vegetation impacts associated with the proposed Project;
- Potential impacts to general vegetation, biologically unique landscapes, and vegetation communities of conservation concern have changed due to the proposed reroute and the exclusive use of Geographical Information Systems (GIS) databases;
- Impacts to terrestrial vegetation associated with ancillary activities and connected actions have changed due to the proposed Nebraska reroute and new information that has become available since preparation of the Final EIS; and
- Section 4.5.5, Recommended Additional Mitigation, provides a list of additional mitigation measures to further reduce impacts to terrestrial vegetation.

The impacts to state or federally threatened, endangered, and candidate species or otherwise protected species and habitat are addressed Section 4.8, Threatened and Endangered Species and Species of Conservation Concern.

4.5.2 Impact Assessment Methodology

The impacts of the proposed Project on biologically unique landscapes and vegetation communities of conservation concern have been evaluated using a qualitative assessment of the potential direct and indirect impacts to species and their habitat through literature review and consultation with regional scientists. The potential impacts would result from the construction and operation of the proposed Project. The primary impacts on vegetation from construction and operation of the proposed Project would be cutting, clearing, or removing the existing vegetation, within the construction work area, potential invasion by noxious weeds, and maintenance activities associated with the proposed Pipeline and ancillary facilities. The magnitude of impact would depend on the type and amount of vegetation affected, the rate at which vegetation would establish after construction, and the frequency of vegetation maintenance conducted on the permanent route during pipeline operation. Potential construction- and operations-related impacts would include:

- Temporary and permanent modification of vegetation community composition and structure from clearing and operational maintenance;
- Increased risk of soil erosion due to lack of vegetative cover;
- Expansion of invasive and noxious weed populations along the proposed pipeline route as a result of construction and operational vegetation maintenance;
- Soil and sod disturbance (mixing of topsoil with subsoil with altered biological activities and chemical conditions that could affect re-establishment and natural recruitment of native vegetation after restoration);
- Compaction and rutting of soils from movement of heavy machinery and transport of pipe sections, altering natural hydrologic patterns, and inhibiting water infiltration, which could affect seed germination;
- Alteration in vegetation productivity and the timing of life cycle stages due to increased soil temperatures associated with heat emanating from the pipeline; and
- Loss of vegetation due to exposure to accidental crude oil releases (see Section 3.13, Potential Releases).

4.5.3 General Vegetation Impacts

Clearing trees within upland, wetland, and riparian forest communities would result in long-term impacts on these vegetation communities given the length of time needed for the community to mature to pre-construction conditions. Permanent impacts to 47.3 acres of forested areas would occur within the 50-foot-wide permanent easements centered on the proposed pipeline. In these areas, trees would be removed and would not be allowed to re-establish due to periodic mowing and brush clearing during pipeline operation. Routine maintenance vegetation clearing would occur no more than every 1 to 3 years. Impacts to the 538.3 acres of shrubland would be long term due to the time required to re-establish the woody vegetation characteristics of this community type. Most shrubs would be expected to re-establish within the non-maintained portion of the proposed route within 5 to 15 years. The permanent easement in shrubland would not be regularly mowed or cleared and would be allowed to revegetate.

Operation of the proposed Project would cause increases in soil temperatures at the soil surface (from 4 to 8 degrees Fahrenheit [˚F]) primarily during winter and greater increases would occur with increasing depth toward the pipeline (from 10 to 15˚F at 6 inches below ground surface), with the most notable increases during spring in the northern portion of the pipeline (see Appendix S, Pipeline Temperature Effects Study). While many plants would not produce root systems that would penetrate much below 6 inches, the root systems of some plants, notably native prairie grasses, often penetrate well below 6 inches. Soil temperatures immediately around the buried pipeline may reach temperatures as much as 40˚F warmer than the ambient surrounding soil temperatures (Appendix S, Pipeline Temperature Effects Study). In general, increased soil temperatures during early spring could cause early germination and emergence and increased productivity in annual crops such as corn and soybeans and in tallgrass prairie species (Appendix S). Increased soil temperatures may lead to localized soil drying and localized decreases in soil moisture available for evapotranspiration.

Impacts on annually tilled croplands generally would be short term and limited to the current growing season because topsoil would be segregated and soils would not be compacted during construction. Impacts on pastures, rotated croplands, and open grassland range generally would be short to long term, with vegetation typically re-establishing within 1 to 5 years after construction. In northern arid portions of the proposed Project, perennial herbaceous cover may require as long as 5 to 8 years to establish cover similar to adjacent undisturbed lands, especially when drought conditions or livestock grazing interfere with re-establishment. Native grasslands with fragile soils could take considerably longer to recover (see Section 4.5.4, Potential Impacts to Biologically Unique Landscapes and Vegetation Communities of Conservation Concern). Impacts on these communities during operation of the proposed pipeline would be minimal, because these areas would recover following construction and typically would not require maintenance mowing.

After removal of vegetation cover and disturbance to the soil, re-establishment of native vegetation communities could be delayed or prevented by infestations of noxious weeds and invasive plants. Vegetation removal and soil disturbance during construction could create optimal conditions for the establishment of many weeds. Construction equipment traveling from weed-infested areas into weed-free areas could disperse noxious weed seeds or propagules (such as buds or spores), resulting in the establishment of noxious weeds in previously weed-free areas. A total of 50 individual noxious weed species may occur along the proposed pipeline corridor. These noxious weeds are identified in Table 3.5-5. Figures 4.5.3-1 through 4.5.3-3 illustrate the land cover types (per the 2006 National Land Cover Database) crossed by the proposed route and Table 4.5-1 below summarizes the potential impacts to vegetation during the construction and operation period for the proposed Project.

Table 4.5-1 Summary of Estimated Impacts on Vegetation Communities

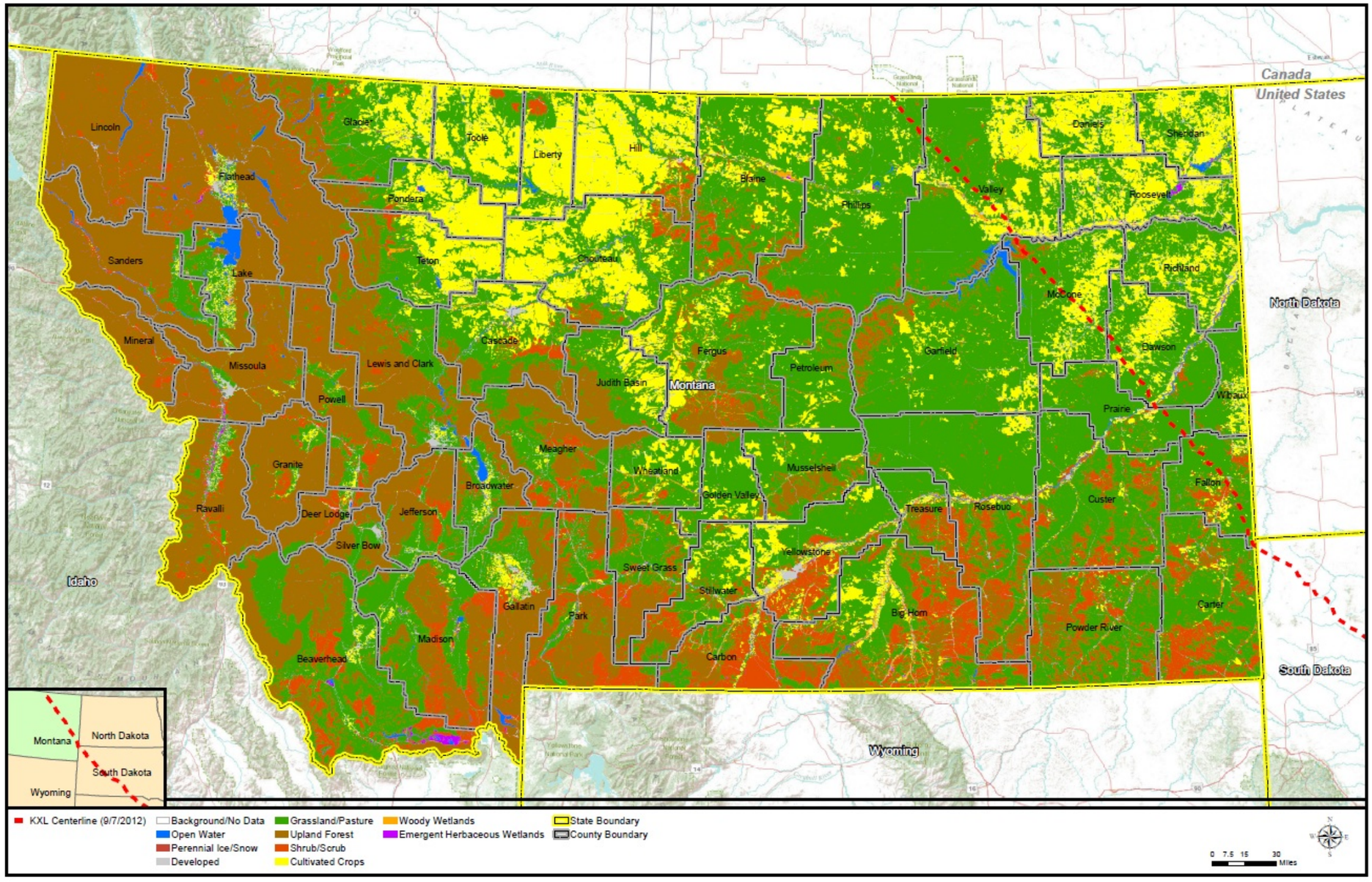
Vegetation Community Classification	Length of Community Crossed (miles)	Community Area Affected during Construction (acres)[a]	Community Area Affected by Operations (acres)[a]
Montana			
Cultivated Crops	61.2	904.8	372.6
Grassland/Pasture	187.4	2,833.7	1,138.7
Upland Forest	0.6	8.0	3.4
Open Water	0.3	1.8	1.8
Forested Wetlands	1.5	19.3	8.9
Emergent Herbaceous Wetlands	0.4	7.1	2.6
Shrub-Scrub	31.1	495.1	189.8
Developed Land	3.6	63.5	22.4
Montana Total	**286.2**	**4,333.5**	**1,740.2**
South Dakota			
Cultivated Crops	49.3	707.7	298.3
Grassland/Pasture	256.5	3,786.8	1,557.6
Upland Forest	0.5	3.3	3.0
Open Water	0.3	1.7	1.5
Forested Wetlands	1.5	21.3	9.0
Emergent Herbaceous Wetlands	1.3	16.2	7.6
Shrub-Scrub	3.0	43.2	18.3
Developed Land	3.7	60.9	22.4

Vegetation Community Classification	Length of Community Crossed (miles)	Community Area Affected during Construction (acres)[a]	Community Area Affected by Operations (acres)[a]
South Dakota Total	**315.9**	**4,641.1**	**1,917.8**
Nebraska			
Cultivated Crops	180.5	2,402.4	1,093.0
Grassland/Pasture	79.8	1,123.9	483.8
Upland Forest	2.0	28.5	12.1
Open Water	0.7	4.5	4.5
Forested Wetlands	1.9	17.2	11.3
Emergent Herbaceous Wetlands	0.6	8.8	3.7
Shrub-Scrub	0.0	0.0	0.0
Developed Land	8.5	136.4	52.3
Nebraska Total	**274.0**	**3,721.8**	**1,660.8**
North Dakota Pipe Yard			
Grassland/Pasture	NA[b]	NA	4.1
Developed Land	NA	NA	2.2
North Dakota Pipe Yard Total			**6.3**
Kansas Pump Stations			
Grassland/Pasture	NA	NA	13.5
Developed Land	NA	NA	1.7
Kansas Pump Stations Total	NA	NA	**15.2**
Project Total			
Cultivated Crops	**291.0**	**4,014.9**	**1,763.9**
Grassland/Pasture	**523.8**	**7,744.4**	**3,197.7**
Upland Forest	**3.1**	**39.8**	**18.1**
Open Water	**1.3**	**8.0**	**7.8**
Forested Wetlands	**4.9**	**57.8**	**29.2**
Emergent Herbaceous Wetlands	**2.3**	**32.1**	**13.9**
Shrub-Scrub	**34.1**	**538.3**	**208.1**
Developed Land	**15.8**	**260.8**	**101.0**
Project Total	**876.1**	**12,696.4**	**5,340.3**

Source: National Land Cover Database (Fry et al. 2011).

[a] Includes acres disturbed on a temporary basis (permanent route width plus temporary workspace) during construction and acres disturbed (maintained) on a permanent basis during operation of the proposed Project. Acreage does not include disturbance associated with tank farm, access roads, pipe stockpile sites, rail sidings, contractor yards, and construction camps.
[b] Not applicable (NA).
Note: the anticipated impacts to waters and wetlands as indicated in the table are based entirely on geographical information system (GIS) information. These acreages are estimates and do not reflect those acreages indicated in Wetlands, Sections 3.4 or 4.4, which include additional field verified data.

In Montana, 86 percent of the construction and operations impacts would be to areas that are Grassland/Pasture (65 percent) and Cultivated Crops (21 percent). In South Dakota, 96 percent of the construction and operations impacts would be to areas that are Grassland/Pasture (81 percent) and Cultivated Crops (15 percent). The Nebraska, 94 percent of the construction and operation impacts would be to areas that are Cultivated Crops (64 percent) and Grassland/Pasture (30 percent). Approximately 65 percent and 88 percent of the operations impacts to the North Dakota pipe yard and the Kansas pump stations, respectively, would be to Grassland/Pasture communities. In total, 93 percent of the construction and operations impacts of the proposed Project would be to areas that are Grassland/Pasture (61 Percent) and Cultivated Crops (32 percent).



Source: Fry et al. 2011.

Figure 4.5.3-1 Montana Land Cover

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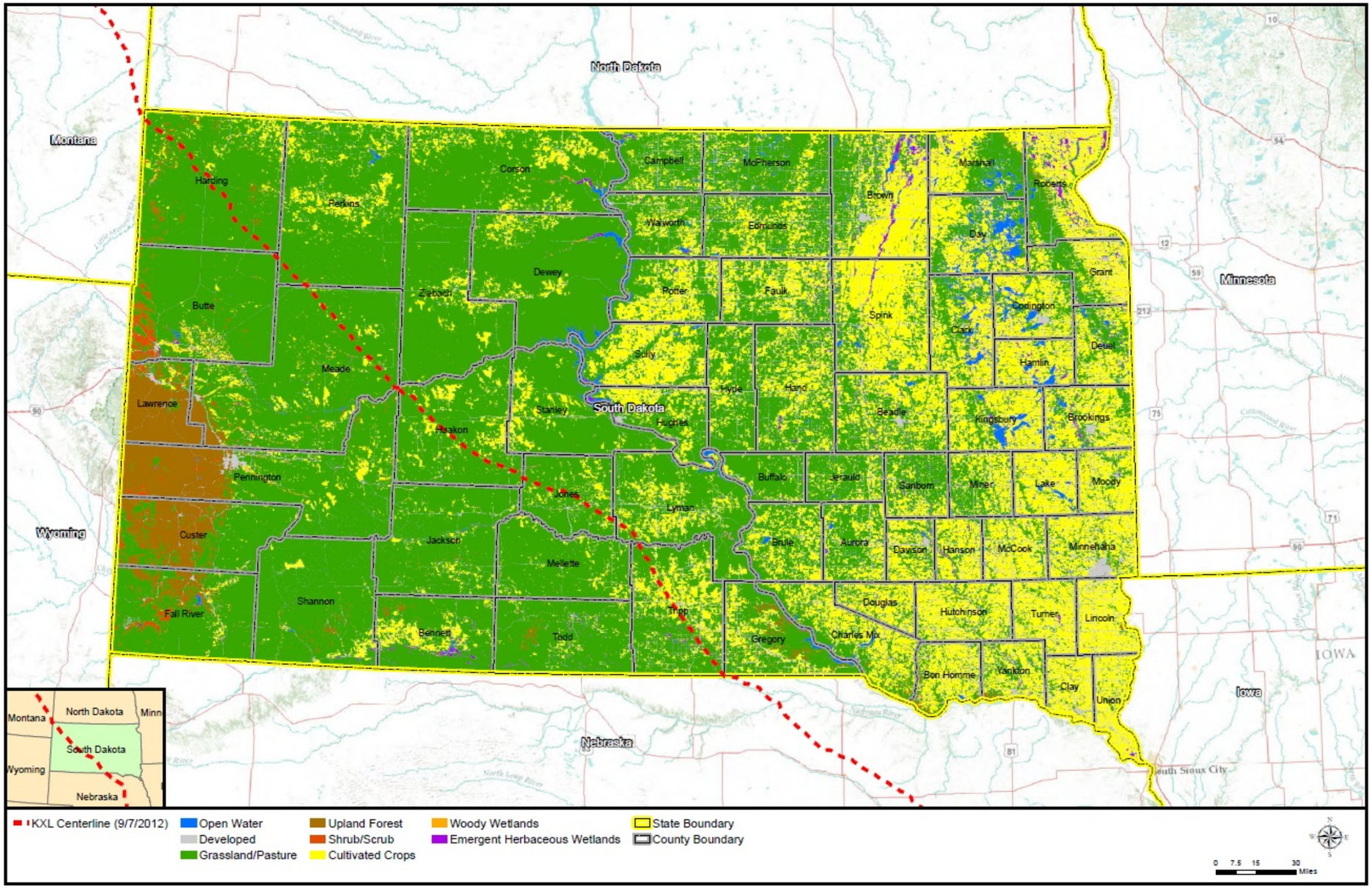

Source: Fry et al. 2011.

Figure 4.5.3-2 South Dakota Land Cover

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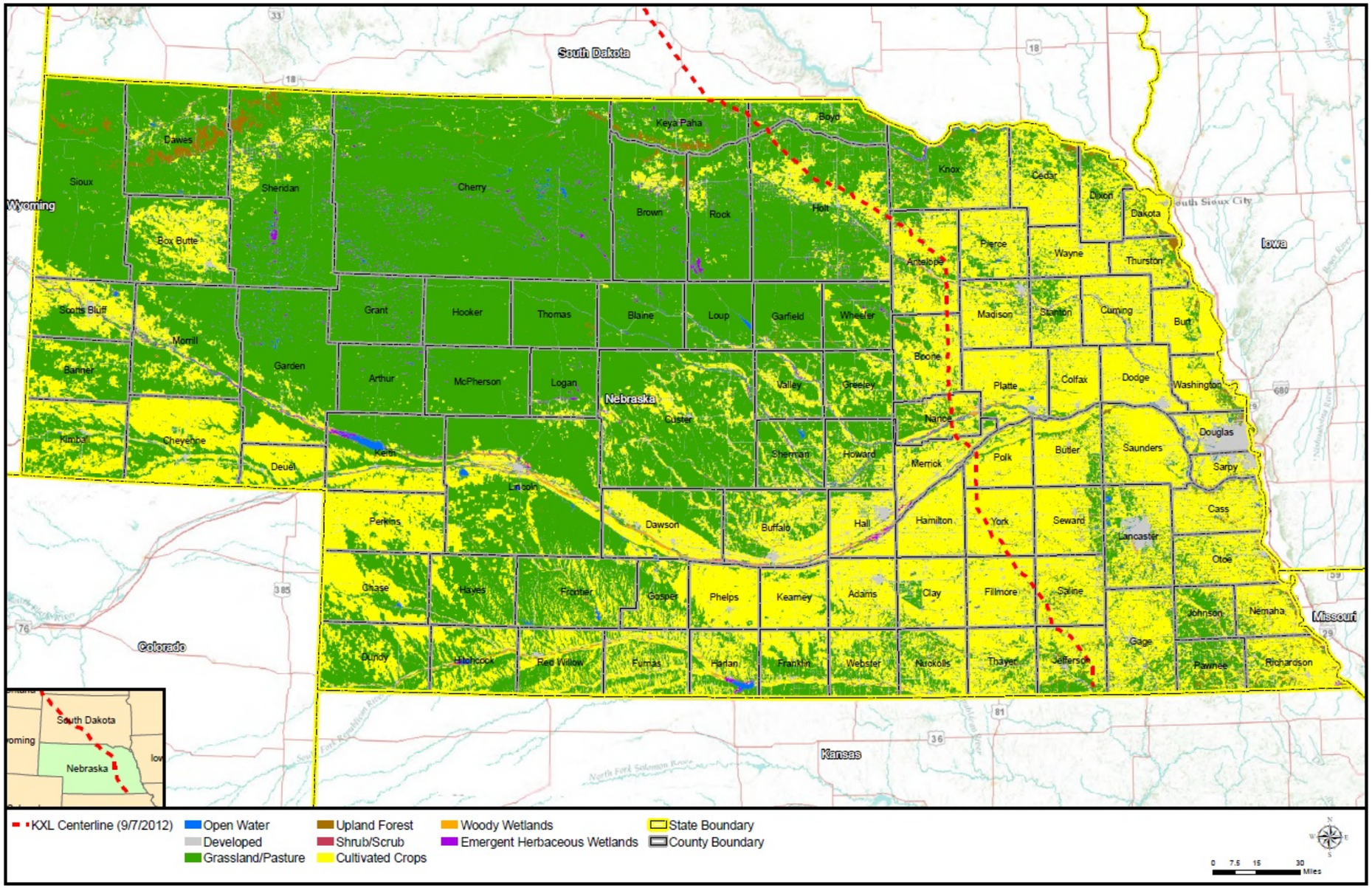

Source: Fry et al. 2011.

Figure 4.5.3-3 Nebraska Land Cover

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4.5.4 Potential Impacts to Biologically Unique Landscapes and Vegetation Communities of Conservation Concern

The potential impacts detailed in Section 3.5.4, Biologically Unique Landscapes and Vegetation Communities of Conservation Concern (including native grasslands, Rainwater Basin, sagebrush steppe, riparian habitats, and forest communities) are presented in Table 4.5-2. The proposed pipeline route would cross an estimated 355 miles of native grassland, distributed across 1,054 individual native grassland communities through Montana, South Dakota, and Nebraska. Although native grasslands would be reseeded with native seed, construction effects on previously untilled native prairies could be long term, as destruction of the prairie sod during trenching may require more than 100 years for recovery. Shortgrass prairie and mixed-grass prairie areas may take 5 to 8 or more years to re-establish due to poor soil conditions and low moisture levels. Construction through native grasslands would expose the fragile soils to erosion by wind and water and re-establishment of vegetative cover in this region would be difficult, requiring an estimated 4 or more years.

Table 4.5-2 Estimated Impacts on Vegetation Communities of Conservation Concern Occurring along the Proposed Project Route[a]

Community Type	Length (miles)	Communities Crossed
Montana		
Native Grasslands[b]	132.3	574
Sagebrush Steppe[c]	0.6	1
Riparian Habitats	6.2	131
Forest Communities	2.5	101
South Dakota		
Native Grasslands[b]	204.9	393
Sagebrush Steppe[c]	54.9	1
Riparian Habitats	0.2	8
Forest Communities	4.0	87
Nebraska		
Native Grasslands[b]	18.5	87
Rainwater Basin Plains	69.5	1
Forest Communities[d]	3.9	93
Total		
Native Grasslands[b]	355.7	1,054
Sagebrush Steppe[c]	55.5	2
Riparian Habitats	6.4	139
Forest Communities	11.4	281
Rainwater Basin Plains	69.5	1

Sources: U.S. Geological Survey (USGS) GAP Analysis (USGS 2011).

[a] Approximate mileage ranges presented. Communities are documented within the ranges presented and categories may overlap. Impacts based on a 110-foot-wide construction corridor.
[b] Native Grasslands include mixed-grass and tallgrass prairie ecosystems as identified in the GAP Analysis (USGS 2011).
[c] Sagebrush Steppe length and communities crossed based on Inter Mountain Basins Big Sagebrush Steppe Ecosystem layer (USGS 2011).
[d] Forest communities occur intermittently throughout the route in the state of Nebraska (mileposts 602-875).

Heat dissipated from the pipeline as discussed above could potentially lead to early germination and increased productivity of native prairie grasses, but may also lead to decreased soil water content, which could be detrimental to native prairie plants (Appendix S, Pipeline Temperature

Effects Study). Invasion of non-native plants also may prevent recovery of prairie grasslands, as would altered land management, which could include suppression of wildfires that help to maintain prairie sod.

The proposed pipeline route would cross an estimated 55.5 miles of Inter Mountain Basins Big Sagebrush Steppe ecosystem habitat. Construction through this ecosystem habitat would remove sagebrush shrubs. The sagebrush shrubland disturbed in the construction phase would typically become re-established within 5 to 15 years. The Sagebrush shrubland in the permanent easement would not be regularly mowed and would also be allowed to revegetate with sagebrush. Minimal maintenance would be necessary in this portion of the right-of-way (ROW) and sagebrush may require 20 to 50 years to re-establish.

The proposed pipeline route would cross an estimated 6.4 miles that lie within 139 riparian areas in the states of Montana and South Dakota. Bottomland forests would require 20 to 50 years or more to re-establish. The proposed pipeline route would cross an estimated 10.4 miles that lie within 281 upland and wetland forest communities. These communities would require 20 to 50 years to re-establish within temporary construction areas. Forests will not be allowed to regenerate within the maintained portion of the proposed Project ROW due to ongoing ROW maintenance activities.

There would be temporary and permanent impacts to Conservation Reserve Program land and Wetlands Reserve Program lands along the proposed pipeline route. The exact location and extent of these easements relative to the proposed Project route is pending additional relevant information and will be included in this review as part of the Final Supplemental Environmental Impact Statement. Successful restoration of native vegetation and Conservation Reserve Program fields (defined as 90 percent cover of desirable perennial plants, stable soils, and comparable vegetation community composition) would be expected within 4 to 8 years.

TransCanada Keystone Pipeline, LP (Keystone) proposes to reduce impacts on vegetation within the construction and permanent ROW and to improve the probability of successful revegetation of disturbed areas by implementing the following measures as described in the proposed Project Construction, Mitigation, and Reclamation Plan (CMRP) (see Appendix G) in accordance with applicable permits:

- Limit construction traffic to the construction ROW, existing roads, newly constructed roads, and approved private roads;
- Clearly stake construction ROW boundaries, including pre-approved temporary workspaces, to prevent disturbance to unauthorized areas;
- Mow or disc crops if present to ground level unless an agreement is made for the landowner to remove for personal use;
- Prohibit burning on cultivated lands, as well as on rangelands and pastures when recommended by regulatory agencies;
- In South Dakota, limit the width of the construction ROW at timber shelterbelts in agricultural areas to the minimum necessary to construct the pipeline;
- Strip topsoil in cultivated and agricultural lands to the actual depth of the topsoil, to a maximum depth of 12 inches;

- Stockpile stripped topsoil in a windrow along the edge of the ROW, such that the potential for subsoil and topsoil mixing is reduced;
- Ensure all temporary mulch materials are weed-free; and
- Limit soil compaction by prohibiting access by certain vehicles, using only machinery with low ground pressure (tracks or extra-wide tires), limiting access and minimize frequency of all vehicle traffic, digging ditches to improve surface drainage, using timber riprap, matting or geotextile fabric overlain with soil, and stopping construction when necessary.

To restore disturbed areas to pre-construction use and vegetation cover, the following reclamation and revegetation measures as described in the proposed CMRP (Appendix G) would be implemented in accordance with applicable permits:

- Test topsoil and subsoil for compaction at regular intervals in agricultural and residential areas.
- Relieve soil compaction on all croplands by ripping a minimum of three passes at least 18 inches deep, and on all pastures by ripping or chiseling a minimum of three passes at least 12 inches deep.
- Relieve subsoil compaction on areas stripped for topsoil salvage by ripping a minimum of three passes at 18 inches or less followed by grading and smoothing if necessary (disc or harrow) to avoid topsoil mixing.
- Replace topsoil to pre-existing depths once ripping and discing of subsoil is complete up to a maximum of 12 inches in order to alleviate compaction on cultivated fields by cultivation.
- Consult with the Natural Resources Conservation Service (NRCS) if there are any disputes between landowners and Keystone as to areas where compaction should be alleviated.
- Plow under organic matter, including wood chips or manure, or plant a new crop such as alfalfa to decrease soil bulk density and improve soil structure, or conduct any other measures in consultation with the NRCS if mechanical relief of compaction is deemed unsatisfactory.
- Inspect the ROW in the first year following construction to identify areas of erosion or settling.
- If soil quality has been deteriorated, the application of soil amendments such as fertilize and soil pH modifiers may be required in accordance with written recommendations from local soil conservation authorities and land management agencies and authorized by the landowners.
- Reseed the reclaimed construction ROW following cleanup and topsoil replacement as closely as possible using seed mixes based on input from the local NRCS and specific seeding requirements as requested by the landowner or the land management agency. Where appropriate, Keystone would retain a local rangeland expert to coordinate area-specific seed mixes.
- Use certified seed mixes to limit the introduction of noxious weeds within 12 months of seed germination testing, and adjust seeding rates based on test results.

- Remove and dispose of excess mulch prior to seedbed preparation to prevent seed drills from becoming plugged and to ensure that seed incorporation can operate effectively.
- Re-apply and anchor temporary mulch, such as erosion control blankets, on the construction ROW following seeding.
- Seed at a rate appropriate for the region and for the stability of the reclaimed surface based on pure live seed.
- Use seeding methods appropriate for weather conditions, construction ROW constraints, site access, and soil types using drill seeding unless the ROW is too steep. Broadcast temporary cover crop seed.
- Delay seeding until soil is in an appropriate condition for drill seeding.
- Use Truax or an equivalent-type drill seeder equipped with a cultipacker that is designed and equipped to apply grass and grass-legume seed mixtures with mechanisms such as seed box agitators to allow even distribution of all species in each seed mix and with an adjustable metering mechanism to accurately deliver the specified seeding rate and depth.
- Operate and calibrate drill seeders so that the specified seeding rate is planted using seed depths consistent with local or regional agricultural practices and row spacing that does not exceed 8 inches.
- Use broadcast or hydro-seeding in lieu of drilling at the recommended seeding rates and use a harrow, cultipacker, or other equipment immediately following broadcasting to incorporate the seed to the specified depth and to firm the seedbed.
- Delay broadcast seeding during high wind conditions and when the ground is frozen.
- Hand rake all areas that are too steep or otherwise cannot be safely harrowed or cultipacked to incorporate broadcast seed to the specified depth.
- Use hydro-seeding on a limited basis, where the slope is too steep or soil conditions do not warrant conventional seeding methods.
- Work with landowners to the extent practicable to discourage intense livestock grazing of the construction ROW during the first growing season by using temporary fencing, deferred grazing, or increased grazing rotation frequency.

The following measures, as identified in the proposed CMRP (Appendix G), would be implemented to minimize impacts specifically to native grasslands:

- Develop noxious-weed-free native seed mixes with input from the local NRCS offices and through collaboration with regional experts.
- Seed disturbance areas in native range with a native seed mix after topsoil replacement.
- Mulch and crimp into the soil noxious-weed-free straw or native prairie hay to prevent wind erosion.
- Imprint the land surface to create impressions in the soil to reduce erosion, improve moisture retention and create micro-sites for seed germination.

- Reduce soil disturbance by using sediment logs or straw wattles in place of slope breakers that are constructed of soil.
- Apply photodegradable matting anchored with biodegradable pins on steep slopes or areas prone to extreme wind exposure such as north- or west-facing slopes and ridge tops.
- Work with landowners to prevent overgrazing of the newly established vegetation.
- Monitor reclamation, repair erosion, and reseed poorly revegetated areas as necessary.
- Monitor the ROW to determine the success of revegetation after the first growing season, and for areas in which vegetation has not been successfully re-established, reseed the area.
- Incorporate minor route alterations to avoid particularly erosion-prone locations where practicable.
- Avoid highly saturated areas to the maximum extent possible.
- Strive to reduce width of disturbance to the native prairie landscape by adopting trench-line or blade-width stripping procedures where practicable.
- Conserve topsoil to a maximum of 12 inches in depth in all areas where excavation occurs.
- Protect topsoil piles from erosion to the degree practicable.
- Manage vehicle traffic in areas with high erosion potential or sensitive habitat.
- Any areas with unsuccessful revegetation would be monitored until adequate vegetation cover is achieved. In addition, the pipeline route would be monitored continually during operations to identify areas of erosion.

These measures for forested uplands and wetlands, as identified in the CMRP (Appendix G), would be implemented:

- Salvage timber or allow landowner to salvage timber as requested by landowners.
- Grub tree stumps to a maximum of 5 feet on either side of the trench line and where necessary for grading a level surface for construction equipment using bulldozers equipped with brush rakes to preserve organic matter.
- Dispose of trees, brush, and stumps as per landowners' requirements as stated in the easement agreement. Fell trees toward the center line of the ROW to avoid damage to nearby trees and branches and recover trees and slash falling outside of the ROW.
- Prune any broken or damaged branches and branches hanging over the ROW as necessary.
- Burn, chip, or remove tree wastes, incorporating chips into soil such that revegetation is not prevented.
- Establish staging areas, approximately 2,000 feet apart in timbered areas, on sites located on approved temporary workspaces in existing cleared areas, and size them appropriately to accommodate the loading equipment.
- Remove unwanted timber from the construction ROW and transport it to a designated all-weather access point or mill.

As listed in the CMRP (Appendix G), the Montana Department of Environmental Quality has suggested the following potential mitigation measures:

- Test topsoils and subsoils for compaction at regular intervals on rangelands and pastures where requested by landowners, land management agencies or permitting agencies; and
- Relieve compaction on rangelands by ripping or chiseling a minimum of three passes at least 12 inches deep where requested by landowners, land management agencies or permitting agencies.

In order to control the introduction and spread of noxious weeds, Keystone in coordination with appropriate local, state, and federal agencies would implement the following construction and restoration procedures as detailed in the CMRP (Appendix G):

- Mark all areas of the ROW which contain infestation of noxious weeds.
- Use pre-construction treatment such as mowing prior to seed development or herbicide application (in consultation with county or state regulatory agencies, and landowners) for areas of noxious weed infestations prior to clearing grading, trenching, or other soil disturbing work to weed infestation locations identified on construction drawings. Keystone would implement Best Management Practices for conducting vegetation control where necessary before and after construction. Agricultural herbicides used would be developed in consultation with county of state regulatory agencies and would not be used within 100 feet of a wetland or waterbody. In Nebraska, herbicides applied prior to or during construction would be non-residual.
- Strip and store topsoil contaminated with weed populations separately from clean topsoil and subsoil.
- Use mulch and straw or hay bales that are free of noxious weeds for temporary erosion and sediment control.
- Clean all construction equipment, including timber mats, with high-pressure washing equipment prior to moving equipment to the next job site; clean the tracks, tires, and blades of equipment by hand or compressed air to remove excess soil prior to movement of equipment out of weed infested areas, or use cleaning stations to remove vegetative materials with high pressure washing equipment.
- Limit the potential for spread of weeds by providing weed control by a state-licensed pesticide applicator at valve sites, metering stations, and pump stations.
- Reimburse adjacent landowners when they must control weeds that are determined to have spread from the proposed Project's aboveground facilities.
- Implement weed control measures as required by any applicable plan and in conjunction with the landowner.

4.5.5 Recommended Additional Mitigation

In addition to the mitigation measures that Keystone would implement as discussed above, the following additional mitigation measures are recommended to minimize adverse impacts to natural vegetation during the construction phase and the operational phase:

- Do not over-prepare revegetation seed beds; instead, leave them intentionally heterogeneous and irregular.
- Re-inspect the ROW after 5 years to identify areas of erosion or settling and to evaluate the re-establishment of vegetation cover;
- Reseed disturbed areas with seed sources from local populations of Native American traditional use plants in areas used to harvest these resources; and
- Use hydro-seeding during extended drought conditions.

4.5.6 Connected Actions

4.5.6.1 Bakken Marketlink Project

The proposed route for the Bakken Marketlink Project is currently cultivated crops and grassland/pasture and there are no waterbodies or wetlands on the property (see Table 4.5-3 below). The two new storage tanks at Cushing would be located within the boundaries of the Cushing tank farm.

Table 4.5-3 Summary of Impacts on Vegetation Communities Crossed by Proposed Bakken Market Link Project

Vegetation Community Classification	Length of Community Crossed (miles)	Community Area Affected by Construction (acres)[a]
Cultivated Crops	1.9	26.7
Grassland/Pasture	2.7	34.7
Upland Forest	0.0	0.0
Open Water	0.0	0.0
Forested Wetlands	0.0	0.0
Shrub-Scrub	1.5	20.5
Emergent Herbaceous Wetlands	0.0	0.0
Developed Land	0.1	1.9
Total	**6.3**	**83.8**

Source: National Land Cover Data (Fry et al. 2011).

[a] Includes acres disturbed on a temporary basis (permanent route width plus temporary workspace) during construction and acres disturbed (maintained) on a permanent basis during operation of the proposed Project. Acreage does not include disturbance associated with tank farm, access roads, pipe stockpile sites, rail sidings, contractor yards, and construction camps.
Note: the anticipated impacts to waters and wetlands as indicated in the table are based entirely on geographical information system (GIS) information. These acreages are estimates and do not reflect those acreages indicated in Wetlands, Sections 3.4 or 4.4, which include additional field verified data.

4.5.6.2 Big Bend to Witten 230-kV Transmission Line

The Western Area Power Administration and Basin Electric Power Cooperative have identified a preferred route for the proposed Big Bend to Witten 230-kilovolt (kV) transmission line project. Lengths of vegetation communities crossed by the preferred route are presented in Table 4.5-4. The preferred route would cross approximately 76 miles of primarily grassland/pasture and agricultural lands.

Table 4.5-4 Summary of Impacts on Vegetation Communities Crossed by Proposed Big Bend to Witten 230-kV Transmission Line Preferred Route

Vegetation Community Classification	Length of Community Crossed (miles)	Community Area Affected by Construction (acres)[a]
Cultivated Crops	24.4	323.9
Grassland/Pasture	43.7	580.1
Upland Forest	0.2	1.9
Open Water	0.1	1.3
Forested Wetlands	0.2	2.0
Shrub-Scrub	0.0	0.0
Emergent Herbaceous Wetlands	0.1	1.7
Developed Land	7.1	96.6
Total	**75.7**	**1,007.4**

Source: National Land Cover Data (Fry et al. 2011).

[a] Includes acres disturbed on a temporary basis (permanent route width plus temporary workspace) during construction and acres disturbed (maintained) on a permanent basis during operation of the proposed Project. Acreage does not include disturbance associated with tank farm, access roads, pipe stockpile sites, rail sidings, contractor yards, and construction camps.
Note: The anticipated impacts to waters and wetlands as indicated in the table are based entirely on GIS information and do not include field verified information. These acreages are estimates and do not reflect those acreages indicated in Wetlands, Sections 3.4 or 4.4.

4.5.6.3 Electrical Distribution Lines and Substations

The primary impacts on vegetation from construction and operation of approximately 300 miles of new power distribution lines and substations in Montana and South Dakota[1] to provide power to the pump stations would be cutting, clearing, or removing the existing woody vegetation within the construction work area and potential invasion by noxious weeds. In general, distribution line construction impacts to vegetation would be minor, as many distribution lines would run alongside existing roadways. Where necessary, trees generally would be removed from the distribution line ROW, and the ROW would be maintained free of vegetation that poses an outage risk to the lines or interferes with access for maintenance. Total miles and area by vegetation community affected by construction and operation of the new distribution lines for the proposed Project are presented in Table 4.5-5. After construction, power providers would restore affected lands in accordance with state and local standards and associated permits.

[1] Complete data for the electric distribution lines and substations were not available for Nebraska and Kansas at the time of this report.

Table 4.5-5 Estimated Impacts on Vegetation Communities Crossed by Proposed Electrical Distribution Lines for the Proposed Project

Vegetation Community Classification	Length of Community Crossed (miles)	Community Area Affected by Construction (acres)[a]
Montana		
Cultivated Crops	24.5	325.3
Grassland/Pasture	96.9	1,288.5
Upland Forest	0.3	4.3
Open Water	0.0	0.0
Forested Wetlands	1.6	20.9
Shrub-Scrub	7.0	94.7
Emergent Herbaceous Wetlands	0.0	0.0
Developed Land	8.5	117.8
Montana Total	**138.8**	**1,851.5**
South Dakota		
Cultivated Crops	23.1	307.2
Grassland/Pasture	103.0	1,377.2
Upland Forest	0.2	2.8
Open Water	0.3	3.5
Forested Wetlands	0.9	12.5
Shrub-Scrub	5.1	67.8
Emergent Herbaceous Wetlands	0.8	9.9
Developed Land	27.7	368.3
South Dakota Total	**161.0**	**2,149.3**
Project Totals		
Cultivated Crops	47.6	632.5
Grassland/Pasture	199.9	2,665.7
Upland Forest	0.5	7.1
Open Water	0.3	3.5
Forested Wetlands	2.5	33.4
Shrub-Scrub	12.1	162.5
Emergent Herbaceous Wetlands	0.8	9.9
Developed Land	36.2	486.1
Grand Project Totals	**299.8**	**4,000.8**

Source: National Land Cover Data (Fry et al. 2011)

[a] Includes acres disturbed on a temporary basis (permanent route width plus temporary workspace) during construction and acres disturbed (maintained) on a permanent basis during operation of the proposed Project. Acreage does not include disturbance associated with tank farm, access roads, pipe stockpile sites, rail sidings, contractor yards, and construction camps.
Note: The anticipated impacts to waters and wetlands as indicated in the table are based entirely on GIS information and do not include field verified information. These acreages are estimates and do not reflect those acreages indicated in Wetlands Sections 3.4 or 4.4.

4.5.7 References

Fry, J., G. Xian, S. Jin, S., J. Dewitz, C. Homer, L. Yang, C. Barnes, N. Herold, and J. Wickham. 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States <http://www.mrlc.gov/downloadfile2.php?file=September2011PERS.pdf>, PE&RS, Vol. 77(9):858-864. Website: http://www.mrlc.gov/nlcd2006.php. Accessed September 2012.

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